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ABSTRACT

Biology 30 is a 12th-grade science course for students in Alberta, Canada. This document is an alternate form for the final test for the course. Intended for administration during January 1989, it contains 70 multiple-choice questions and seven written-response questions. Two and one-half hours are allowed for completing the test. No answer key is included since scoring is done by the provincial education department. (CW)

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GRADE 12 DIPLOMA EXAMINATION

Biology 30

January 1989
Form B

Alberta
EDUCATION

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GRADE 12 DIPLOMA EXAMINATION
BIOLOGY 30

DESCRIPTION

Time: 2½ hours

Total possible marks: 100

This is a **CLOSED-BOOK** examination consisting of two parts:

PART A: 70 multiple-choice questions each with a value of 1 mark.

PART B: Seven written-response questions for a total of 30 marks.

GENERAL INSTRUCTIONS

Fill in the information on the answer sheet as directed by the examiner.

For multiple-choice questions, read each carefully and decide which of the choices BEST completes the statement or answers the question. Locate that question number on the answer sheet and fill in the space that corresponds to your choice. USE AN HB PENCIL ONLY.

Example

This examination is for the subject area of

A. Biology
B. Chemistry
C. Mathematics
D. Physics

Answer Sheet

A	B	C	D
●	②	③	④

If you wish to change an answer, please erase your first mark completely.

For written-response questions, read each carefully and write your answer in the space provided in the examination booklet.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET

The presiding examiner will collect the answer sheet and examination booklet for transmission to Alberta Education.

JANUARY 1989
FORM B

PART A

INSTRUCTIONS

There are 70 multiple-choice questions with a value of one mark each in this section of the examination. Use the separate answer sheet provided and follow the specific instructions given.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

WHEN YOU HAVE COMPLETED PART A, PROCEED DIRECTLY TO PART B

DO NOT TURN THE PAGE TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER

1. Which organelle is paired INCORRECTLY with its function?

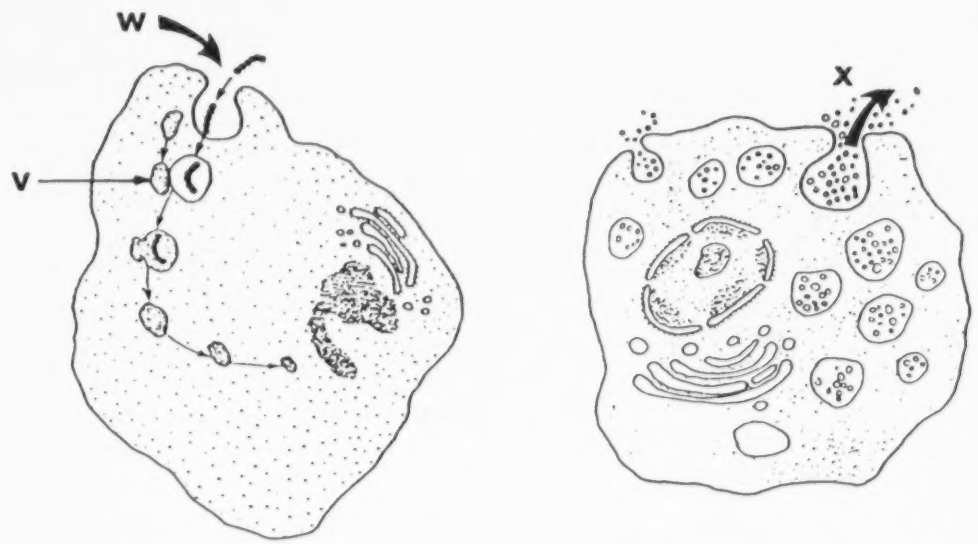
   A. Lysosome - digestion
   B. Microvillus - absorption
   C. Cilium - transport of particles
   D. Mitochondrion - passive transport

2. What process enables some cells to obtain proteins from their environment?

   A. Diffusion
   B. Exocytosis
   C. Phagocytosis
   D. Passive transport

Use the following diagram to answer question 3.

A Diagrammatic Representation of Some Cell Processes



3. Processes labelled W and X RESPECTIVELY represent

   A. exocytosis and phagocytosis
   B. phagocytosis and exocytosis
   C. phagocytosis and diffusion
   D. diffusion and exocytosis

---

4. Red blood cells contain higher concentrations of iron than does the plasma that surrounds them. The MOST probable reason for this phenomenon is that

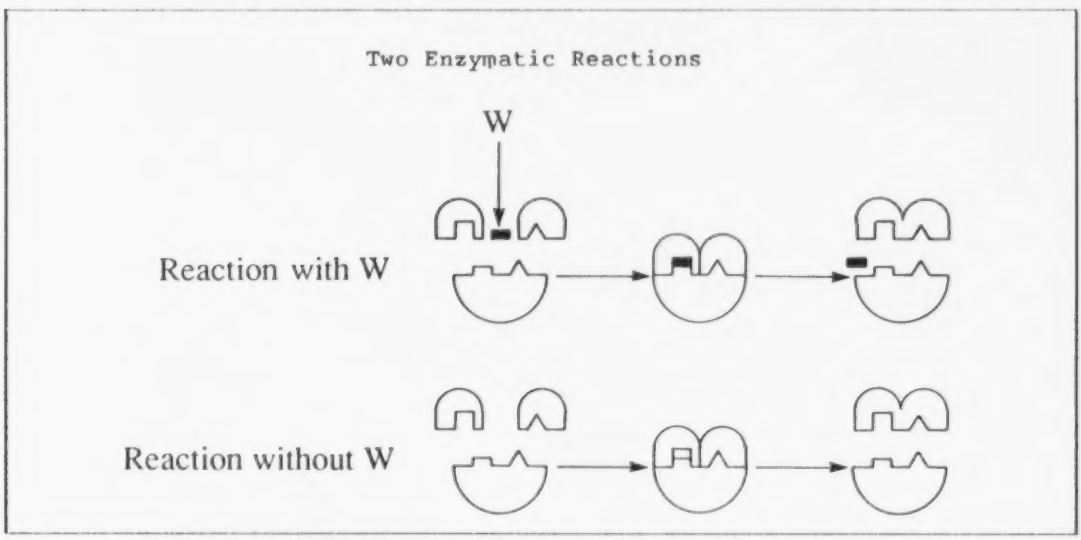
A. iron moves into the cytoplasm by diffusion
B. water moves out of the cytoplasm by osmosis
C. water moves out of the cell by active transport
D. iron moves into the cytoplasm by active transport

5. Enzymes function in chemical reactions by

A. increasing the energy required for the reaction
B. decreasing the energy required for the reaction
C. increasing the concentration of the reactants
D. decreasing the concentration of the products

Use the following information to answer question 6.

Two Enzymatic Reactions



6. The structure labelled W represents

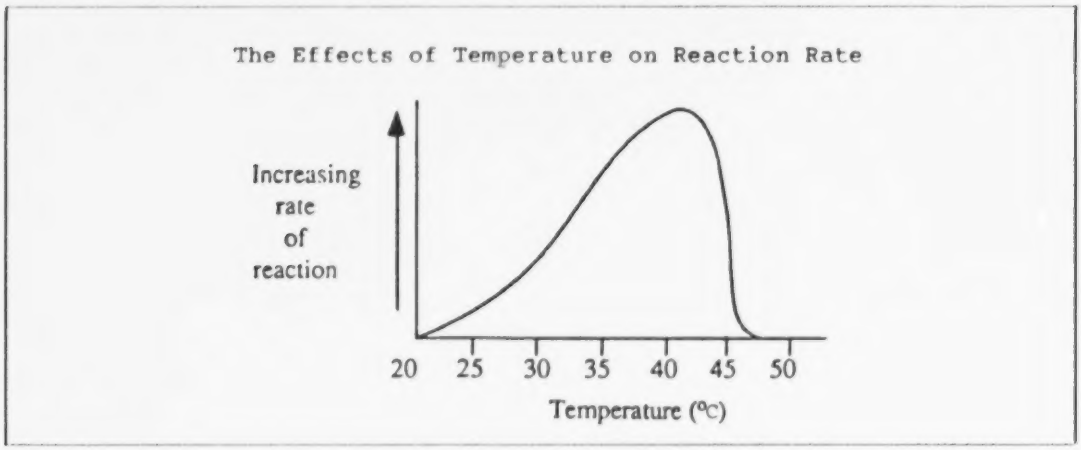
A. an enzyme
B. a substrate
C. a co-enzyme
D. an inhibitor

---

7. When a solution is acidic,

A. the pH is greater than 7
B. it is more concentrated than a basic solution
C. hydrogen ions are displaced by hydroxide ions
D. there is a higher concentration of hydrogen ions than hydroxide ions

Use the following graph to answer question 8.

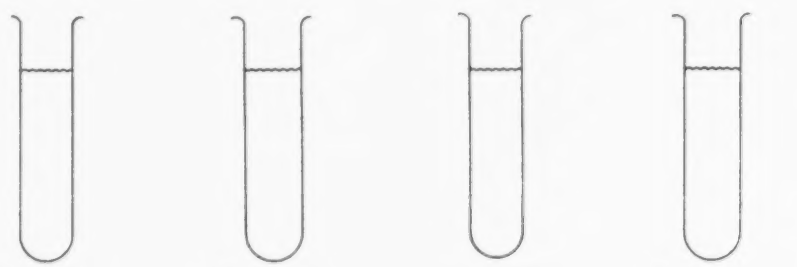


8. At which temperature has the enzyme undergone complete denaturation?

A. 40°C
B. 43°C
C. 45°C
D. 47°C

Use the following information to answer question 9.

A student attempted to determine some major food types present in an unknown sample. She set up four test tubes with the following mixtures:

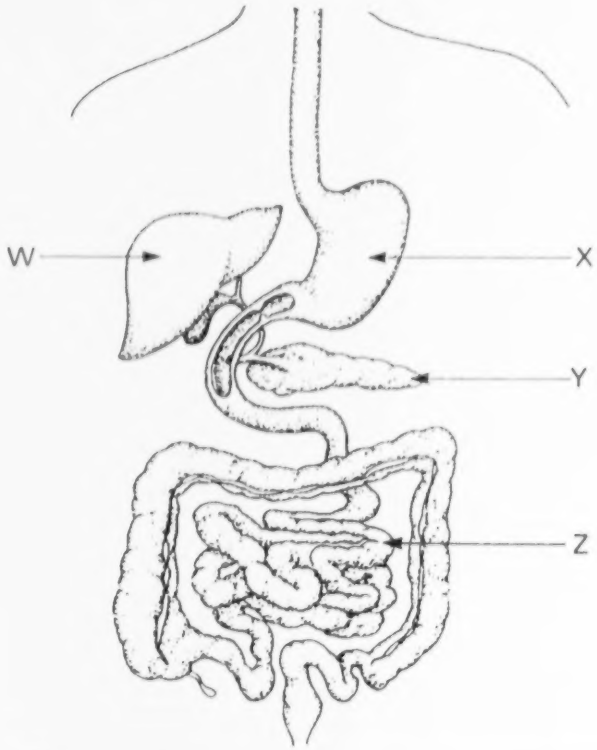


9. This experiment could be used to identify the presence of

A. proteins only
B. lipids and reducing sugars
C. proteins and reducing sugars
D. proteins, carbohydrates, and lipids

Use the following diagram to answer question 10.

Some Organs of the Human Digestive System



10. Bile has its MAIN effect in the organ labelled

A. W
B. X
C. Y
D. Z

---

11. If bile is not produced during digestion,

A. lipids will be found in the feces
B. proteins will be found in the feces
C. lipids will be absorbed into the blood at a faster rate
D. proteins will be absorbed into the blood at a faster rate

Use the following INCOMPLETE laboratory report to answer questions 12 and 13.

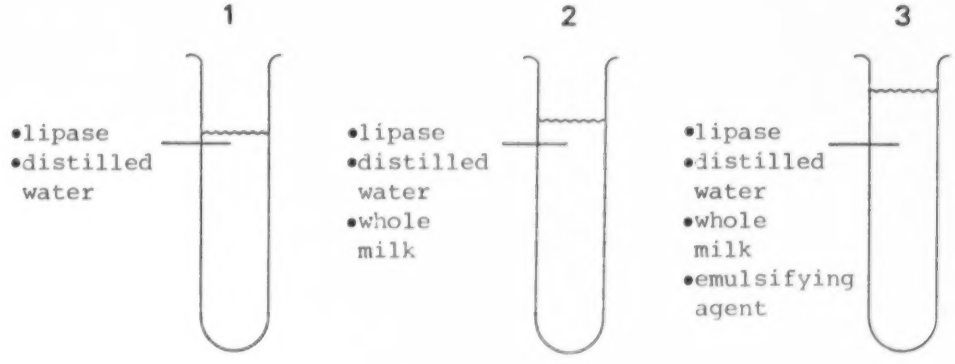
Title: The Partial Digestion of Milk

Purpose: To investigate the role of an emulsifying agent in the digestion of whole milk.

Background: Phenolphthalein is a pH indicator that turns red in alkaline conditions and remains colorless in acidic conditions.

Design: The experiment was set up as illustrated in the diagram.

Procedure: Several drops of phenolphthalein were added to each of three test tubes labelled 1, 2, and 3. All three test tubes were incubated at 37°C for 20 minutes.



Observations: Test tube #1 remained red.
Test tube #2 remained red.
Test tube #3 turned colorless.

12. The type of substance in test tube #3 that caused the observed result was

A. glucose
B. glycerol
C. fatty acid
D. amino acid

13. Which variable was NOT held constant in this experiment?

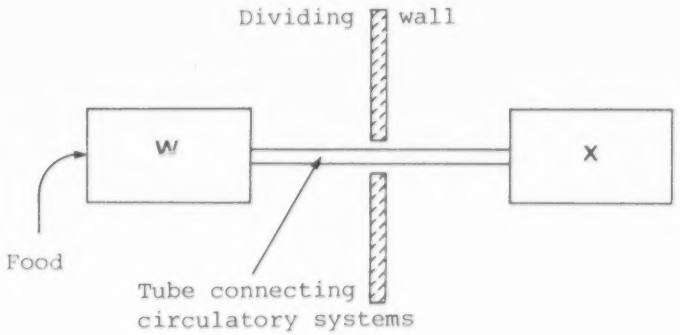
A. Time
B. Temperature
C. Type of enzyme
D. Volume of solutions

14. Cooked egg white was added to a test tube containing water, pepsinogen, and sodium hydroxide. The test tube and contents were then incubated overnight at 37°C. Little or no digestion occurred because

A. water severely diluted the reaction
B. pepsin could not digest egg white protein
C. pepsinogen could not function in a basic medium
D. egg white was not broken down by sodium hydroxide

Use the following information to answer question 15.

In the 1890s the physiologist Ivan Pavlov investigated possible factors that may control gastric secretion. In one experiment he connected the circulatory system of Dog W to the circulatory system of Dog X. The dogs were kept in separate rooms during the investigation.



Food was given to Dog W but not to Dog X. The level of HCl secretion in the stomachs of both dogs increased.

15. From this experiment, one should infer that

A. food is necessary for hydrochloric acid secretion
B. hydrochloric acid secretion is under nervous control
C. hydrochloric acid secretion is under hormonal control
D. food must be present in the stomach to cause hydrochloric acid secretion

16. Absorption of nutrients through the intestinal wall continues even when the concentration of nutrients in the intestine is low compared to the concentration of nutrients in the blood of the intestinal capillaries. This indicates that absorption involves

A. active transport
B. exocytosis
C. diffusion
D. osmosis

17. Ulcers of the stomach may be treated by

A. the use of antibiotics to regulate pH

B. stimulating blood flow to the stomach and increasing the rate of digestion

C. reducing the flow of gastric juices, thereby allowing repair of the stomach lining

D. surgery to repair nerves to the stomach, thereby increasing the flow of gastric juices

18. The removal of a portion of the large intestine is occasionally performed if the organ is badly ulcerated. One predictable side effect of such an operation would be a

A. decrease in the absorption of some vitamins
B. serious reduction in peristalsis
C. reabsorption of too much water
D. decline in food absorption

19. In the villi, amino acids from digested proteins enter the

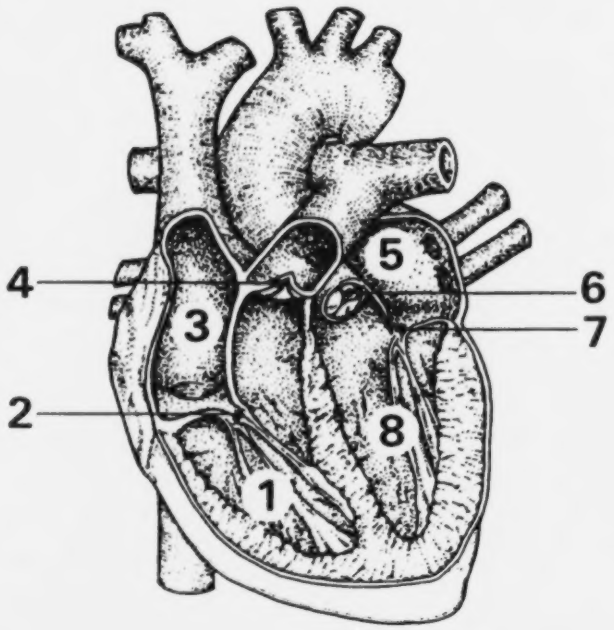
A. venules
B. arterioles
C. capillaries
D. lymph vessels

20. The final stage of chemical digestion of ingested protein occurs in which organ?

A. Large intestine
B. Small intestine
C. Stomach
D. Liver

Use the following diagram to answer questions 21 and 22.

The Human Heart



21. Blood entering the structure labelled 5 is

A. oxygenated and coming from the lungs
B. deoxygenated and coming from the lungs
C. oxygenated and coming from the head and shoulder region
D. deoxygenated and coming from the head and shoulder region

22. When structures 4 and 6 are open, structures

A. 1 and 8 are relaxed; 2 and 7 are open
B. 1 and 8 are contracted; 2 and 7 are closed
C. 3 and 5 are relaxed; 2 and 7 are open
D. 3 and 5 are contracted; 2 and 7 are closed

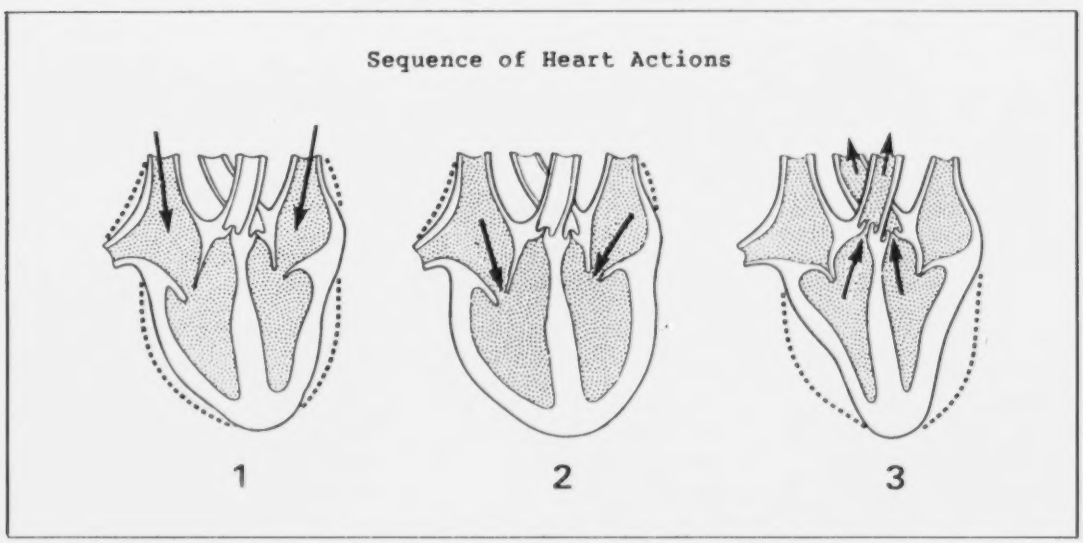
23. Blood pressure in arteries decreases when

A. blood volume increases
B. blood viscosity increases
C. arteries increase in diameter
D. arteries become less flexible

24. Bone tissue releases a vital substance that is involved in the processes of blood clotting and muscle contraction. This substance is

A. ATP
B. iron
C. calcium
D. vitamin D

Use the following sequence of diagrams to answer question 25.

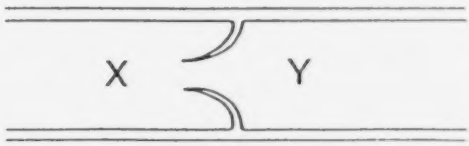


25. Diagram 2 shows

A. atrial and ventricular systole
B. atrial and ventricular diastole
C. atrial systole and ventricular diastole
D. atrial diastole and ventricular systole

Use the following diagram to answer question 26.

A Longitudinal Section of a Blood Vessel



26. Which alternative in the chart below identifies the correct direction of blood flow, the correct condition of the blood, and the correct type of vessel?

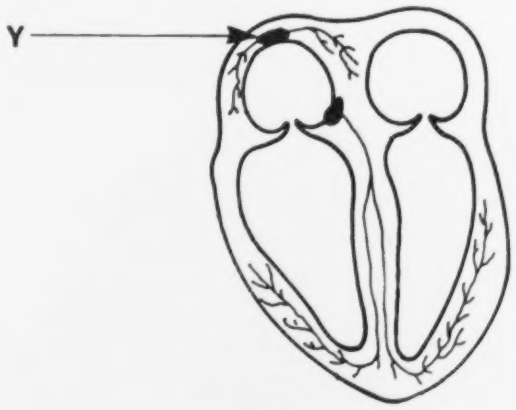
	Direction of Blood Flow	Oxygen Level of Blood	Type of Vessel
A.	Y to X, toward the heart	deoxygenated	vein
B.	Y to X, away from the heart	oxygenated	pulmonary artery
C.	Y to X, toward the heart	oxygenated	artery
D.	Y to X, away from the heart	deoxygenated	pulmonary vein

27. "Blood doping," which was a controversial issue at the Calgary Olympics, is an attempt to increase oxygen supply to the muscles by the transfusion of what major blood component?

A. Plasma
B. Leukocytes
C. Lymphocytes
D. Erythrocytes

Use the following diagram to answer question 28.

A Longitudinal Section of a Human Heart



28. The function of the structure labelled Y is to

A. control the rate of the heartbeat
B. monitor CO_2 and O_2 concentrations
C. monitor blood pressure in the atria
D. delay nervous impulses before they travel to the atria

29. The production of red blood cells is

A. decreased at high altitude
B. facilitated when iron is available
C. inhibited when blood pressure is high
D. increased when abundant O_2 is available

30. Phlebitis is a disease in which the veins become inflamed. The inflammation can lead to the formation of clots because

A. foreign protein (antigens) will have been introduced into the blood
B. platelets will rupture more easily in the blood
C. production of plasma proteins will increase
D. phagocytic leucocyte activity will increase

31. Two important functions of the lymphatic system are to

A. return interstitial fluid to the blood and to combat disease
B. combat disease and to destroy red blood cells
C. filter foreign particles and to carry O_2
D. absorb large molecules and to carry CO_2

32. Swelling of body tissues (edema) may be caused by

A. low blood pressure, resulting in a decreased movement of water into the lymph system

B. high blood pressure, resulting in an increased flow of water through the lymph system

C. low blood pressure, resulting in an increased movement of water into interstitial fluid

D. high blood pressure, resulting in an increased movement of water into interstitial fluid

Use the following information to answer question 33.

In a medical analysis, a sample of cells of an unknown blood type was mixed with concentrated sera from known blood types and the results tabulated.

Anti-sera from	Cells	Observations
type AB blood	unknown	no clumping
type A blood	unknown	clumping
type B blood	unknown	no clumping
type O blood	unknown	clumping

Note: Sera are fluid portions of coagulated blood samples. Current technology may be used to increase the concentration of antibodies in the sera.

33. From the above observations, the unknown sample is of

A. blood type A
B. blood type B
C. blood type O
D. blood type AB

34. When a person who has had a stroke experiences numbness in one arm, the numbness is caused by

A. a blood clot in the brain, which prevents blood from reaching the portion of the brain that detects arm sensations

B. deposits of cholesterol in the arteries of the arm, which exert pressure on the sensory nerves

C. damage to the heart, which prevents sufficient blood from being pumped to the arm

D. a blood clot in a vein of the arm, which causes the arm to swell

35. Victims of starvation suffer from edema (swelling of body tissues). The edema is due to

A. decreased white blood cells
B. increased white blood cells
C. increased urea in the plasma
D. decreased protein in the plasma

36. The function of the cartilaginous rings in the tracheal wall is to

A. prevent collapse of the trachea
B. moisten, warm, and filter the incoming air
C. stimulate peristaltic movement in the trachea
D. stimulate ciliary sweeping action in the trachea

37. Prolonged breathing of carbon monoxide gas is extremely serious because carbon monoxide

A. stops diffusion in the alveoli
B. combines with oxygen in cells to form CO_2
C. binds more readily with hemoglobin than does O_2
D. dissolves in the plasma and alters the blood pH

Use the following information to answer question 38.

Three tests were performed with the results indicated:

I. Breath was exhaled into a phenol red solution. The indicator turned yellow.

II. An acid was added to phenol red. The indicator turned yellow.

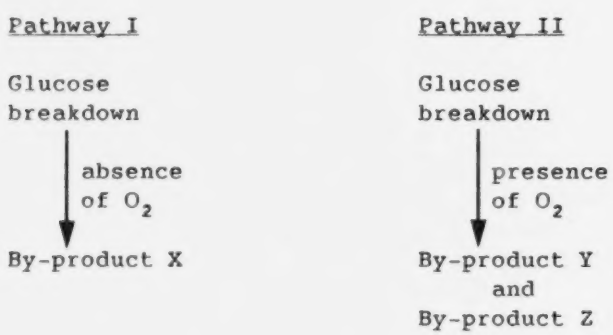
III. Water containing carbon dioxide was added to phenol red. The indicator turned yellow.

38. From the above series of tests, which is the most reasonable hypothesis about the substance in exhaled air that affected the indicator?

A. Carbon dioxide forms an acid in solution and increases the pH.
B. Carbon dioxide forms an acid in solution and decreases the pH.
C. Carbon dioxide forms a base in solution and decreases the pH.
D. Carbon dioxide forms a base in solution and increases the pH.

Use the following information to answer question 39.

Two Metabolic Pathways



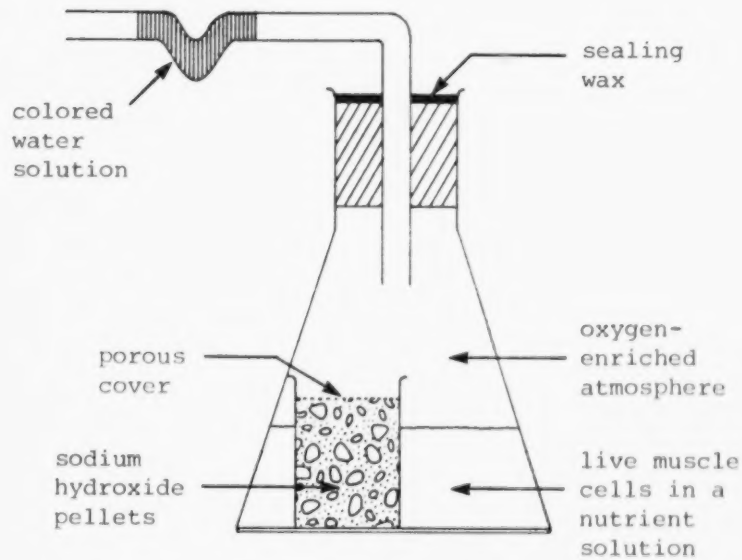
39. The amount of ATP produced by Pathway

A. I and Pathway II is zero
B. I is the same as that produced by Pathway II
C. I is greater than that produced by Pathway II
D. II is greater than that produced by Pathway I

Use the following information to answer question 40.

A Respiration Experiment

The apparatus was set up as illustrated, agitated periodically, and then left for 24 hours.



Note: Sodium hydroxide absorbs CO_2.

40. At the end of the 24-hour period the muscle cells were found to contain some lactic acid. Which statement is a LIKELY reason for the presence of lactic acid?

A. Carbon dioxide buildup blocks aerobic respiration.

B. Lactic acid builds up with increasing levels of oxygen.

C. Diminishing quantities of oxygen cause the cells to respire anaerobically.

D. Diminishing quantities of carbon dioxide cause the cells to respire anaerobically.

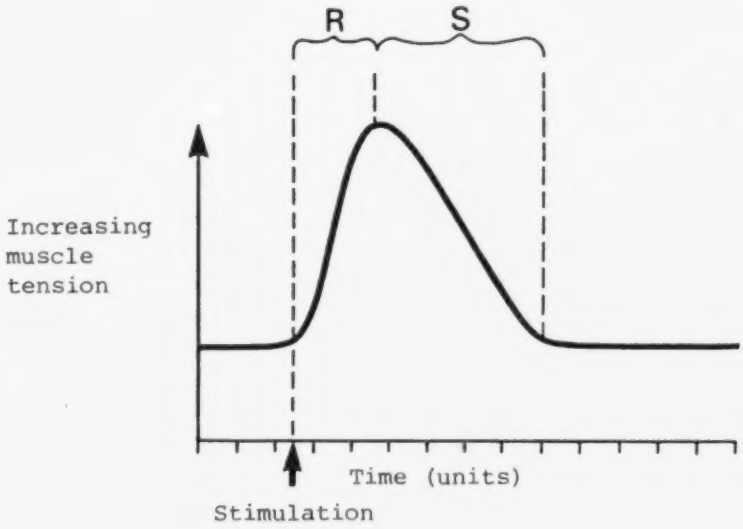
---

41. When deprived of food, the body depletes its reserves in which order?

A. Carbohydrates, fats, and proteins
B. Proteins, carbohydrates, and fats
C. Fats, carbohydrates, and proteins
D. Proteins, fats, and carbohydrates

Use the following information to answer question 42.

A Myogram of a Single Muscle Twitch



Note: A myogram is a recording of a muscular contraction and relaxation.

42. In the section of the graph labelled "S"

A. ATP would not be utilized
B. calcium ions would be released
C. actin and myosin filaments would slide apart
D. actin and myosin filaments would slide closer together

---

43. Under certain conditions some living cells do NOT produce water as a waste product of cellular respiration. Such cells MOST likely

A. utilize aerobic respiration to generate ATP
B. utilize anaerobic respiration to generate ATP
C. do not require a final electron acceptor to generate ATP
D. rely on an energy source other than glucose to generate ATP

44. The proximal convoluted tubule of the nephron functions in the reabsorption of certain substances. Which structural changes in these tubule cells would increase the reabsorption process?

A. Increased surface area and increased number of mitochondria
B. Increased surface area and decreased number of mitochondria
C. Decreased surface area and decreased number of mitochondria
D. Decreased surface area and increased number of mitochondria

45. As the nephric filtrate passes through the tubules of the nephron, urine is formed. This change occurs because

A. water, ions, and nutrients are secreted by the blood, thus forming urine

B. water is absorbed from the capillaries and is added to the nephric filtrate to form urine

C. concentration gradients exist so that desirable substances move passively back into the blood

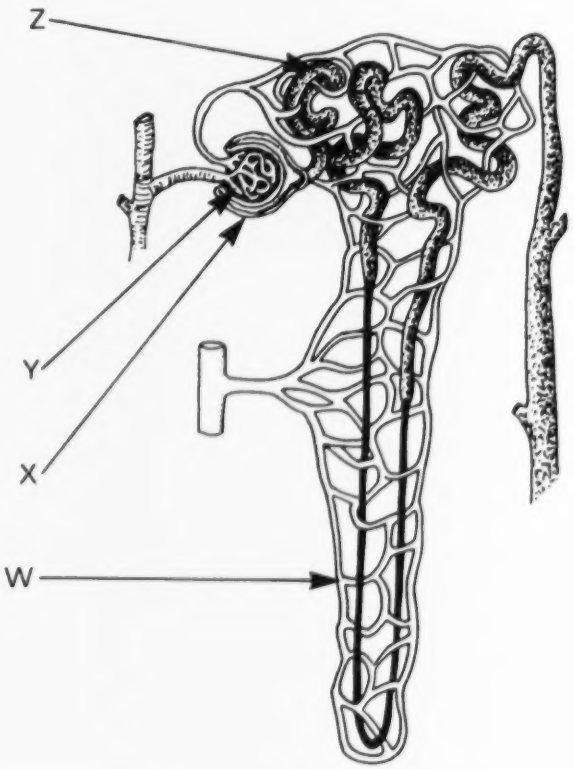
D. desirable substances are actively or passively reabsorbed into the blood but waste substances remain

46. Analysis of fluid from various kidney structures would indicate the HIGHEST concentration of urea in the

A. collecting ducts
B. nephric tubules
C. renal artery
D. renal vein

Use the following diagram to answer question 47.

A Nephron



47. Most reabsorption of glucose occurs from the area labelled

A. W
B. X
C. Y
D. Z

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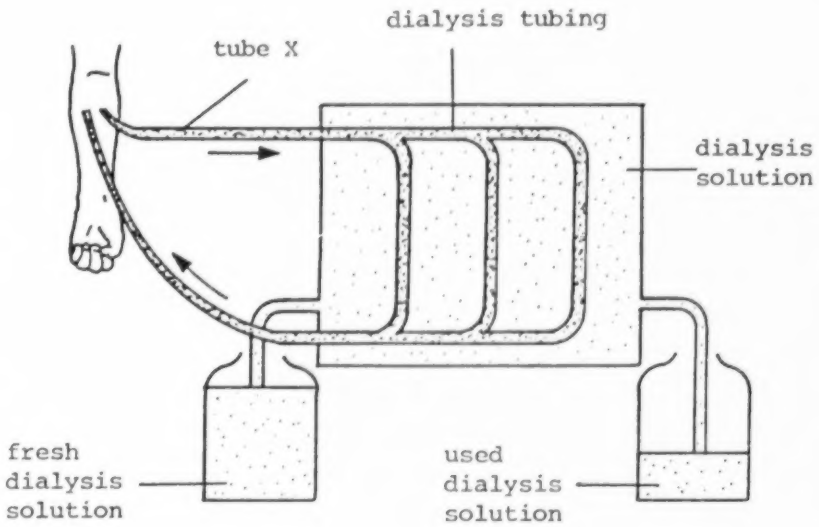
48. The homeostatic response to a drop in blood pressure is

A. decreased urine formation and increased Na^+ and H_2O reabsorption
B. increased urine formation and decreased Na^+ and H_2O reabsorption
C. decreased urine formation and no change in Na^+ and H_2O reabsorption
D. increased urine formation but no change in Na^+ and H_2O reabsorption

Use the following information to answer question 49.

Patients who experience kidney failure are attached temporarily to a dialysis machine to restore homeostatic conditions to the blood.



49. Tube X has a similar function to what vessel in the body?

A. Renal artery
B. Renal vein
C. Vena cava
D. Ureter

---

50. A thyroid gland that is secreting insufficient amounts of hormone would PROBABLY cause an individual to

A. be overactive
B. be underactive
C. secrete smaller amounts of TSH
D. have a higher rate of metabolism

Use the following information to answer question 51.

> The hypothalamus produces thyrotropic releasing factor (TRF).
>
> TRF stimulates the pituitary to produce thyroid stimulating hormone (TSH).
>
> TSH stimulates the thyroid gland to produce thyroxin.

51. An excess of thyroxin should result in feedback to the

A. pituitary, which increases the production of TSH
B. hypothalamus, which decreases the production of TRF
C. thyroid, which decreases the production of thyroxin
D. hypothalamus, which increases the production of TRF

---

52. A blindfolded acrobat performing on a tightrope depends for balance MAINLY on the

A. cerebellum and semicircular canals
B. cerebellum and eustachian tube
C. cerebral cortex
D. cochlea

53. The bones of the middle ear

A. transmit sound waves
B. are located in the cochlea
C. respond to changes in the position of the head
D. are sense receptors connected to the auditory nerve

54. The effect of insulin on glucose metabolism is that it

A. stimulates the formation of carbohydrates in the liver from noncarbohydrate sources and facilitates the breakdown of lipids in the liver and fat tissue

B. facilitates the uptake and utilization of glucose by cells and prevents the excessive breakdown of glycogen in liver and muscle

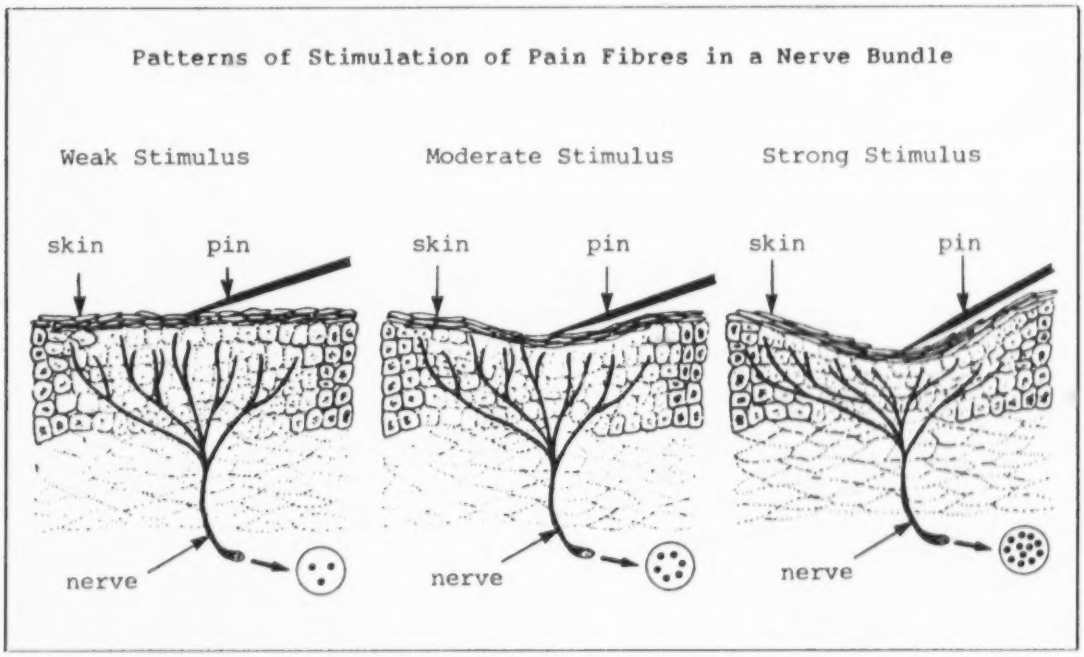
C. facilitates the conversion of liver glycogen to blood glucose

D. stimulates the breakdown of proteins to be used as fuel

55. If an object is placed very close to one's eye, the image blurs because the

A. pupil cannot enlarge enough
B. lens cannot focus the image on the retina
C. image would be focused only on the fovea centralis
D. light intensity is reduced below the threshold level of receptor cells

Use the following diagram to answer question 56.



56. What principle of nerve impulse transmission is BEST illustrated by the above diagram?

A. Sensory nerves consist of many individual fibres.

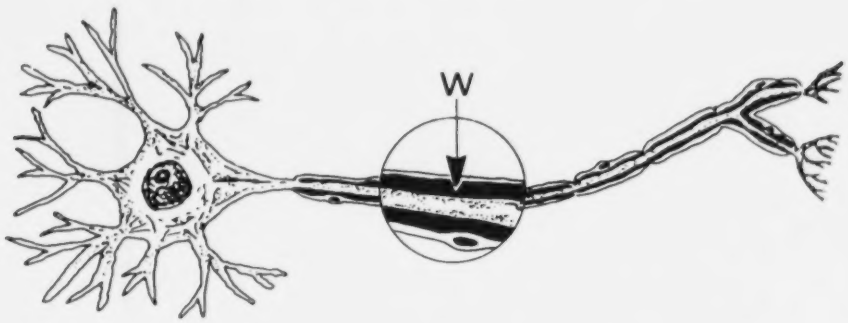
B. The impulse that a single neuron transmits can vary in strength.

C. Variation in signal strength corresponds to the number of fibres activated.

D. Different types of external stimuli are all converted into neuron impulses for the purpose of transmission.

Use the following diagram to answer question 57.

A Human Neuron



57. The structure labelled W functions by

A. causing the sodium ions to diffuse inward
B. increasing the permeability of the membrane to potassium
C. reducing the speed of nerve conduction and insulating the axon
D. insulating the axon and increasing the velocity of nerve conduction

---

Use the following information to answer question 58.

Random Order of Events Prior to Nerve Impulse Conduction

1. Sodium ions diffuse inward.
2. Ion channels close, and the membrane becomes less permeable to sodium and potassium.
3. A threshold stimulus is received.
4. Potassium ions diffuse outward.
5. Sodium channels in the membrane open.
6. Potassium channels in the membrane open.

58. Which sequence places the events leading to the conduction of a nerve impulse in the proper order?

A. 1, 5, 4, 6, 2, and 3
B. 2, 3, 1, 5, 4, and 6
C. 3, 5, 1, 6, 4, and 2
D. 3, 6, 4, 5, 1, and 2

Use the following information to answer questions 59 and 60.

Observations Concerning a Synapse

I. Electron micrographs of a synapse show that there is no direct connection between the end of the axon of one neuron and the dendrites of the next one.

II. A synapse slows down the transmission of the nerve impulse.

III. Transmission across a synapse is always one way: from the end of an axon to a dendrite.

IV. Successive transmissions across a synapse bring about fatique of synaptic transmission.

V. Stimulation of some neurons actually seems to inhibit the neurons that lead away from them at a synapse.

59. The assumption that the end of the axon contains a limited amount of neurotransmitter substance accounts for observation

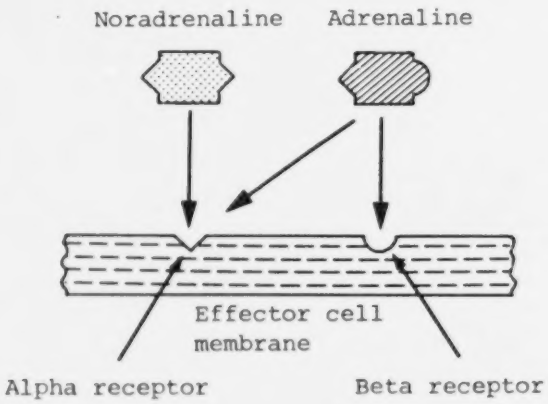
A. I
B. II
C. III
D. IV

60. The discovery that not all neurons release the same transmitter substance at a synapse accounts for observation

A. II
B. III
C. IV
D. V

Use the following information to answer question 61.

The Effects of Neurotransmitters on Cell Receptor Sites



Both noradrenaline and adrenaline combine with receptors of the effector cell. Noradrenaline combines with alpha receptors, while adrenaline combines with both alpha and beta receptors.

61. Considering the information provided, which statement about the neurotransmitter chemicals is TRUE?

A. The way these substances influence effector cells depends on the relative numbers of alpha and beta receptors present in cell membranes.

B. Adrenaline always has an inhibitory action when it combines with receptors on the effector cell membrane.

C. Noradrenaline causes a greater response from effector cells than adrenaline.

D. Both alpha and beta receptors are influenced by noradrenaline.

Use the following information to answer question 62.

Random Order of Components of a Simple Reflex Arc

1. Sensory neuron
2. Motor neuron
3. Receptor
4. Effector
5. Association neuron (interneuron)

62. The order in which an impulse is conducted through a reflex arc from the time that a stimulus is received until the appropriate action is carried out is

A. 1, 3, 2, 4, and 5
B. 1, 5, 2, 4, and 3
C. 3, 1, 5, 2, and 4
D. 3, 2, 5, 1, and 4

63. An example of negative feedback is the process by which

A. nerves stimulate glands to produce hormones

B. the production of hormones is regulated by the central nervous system

C. unnecessary hormones are absorbed back into the gland that produced them

D. accumulation of a hormone in the blood inhibits further production of that hormone

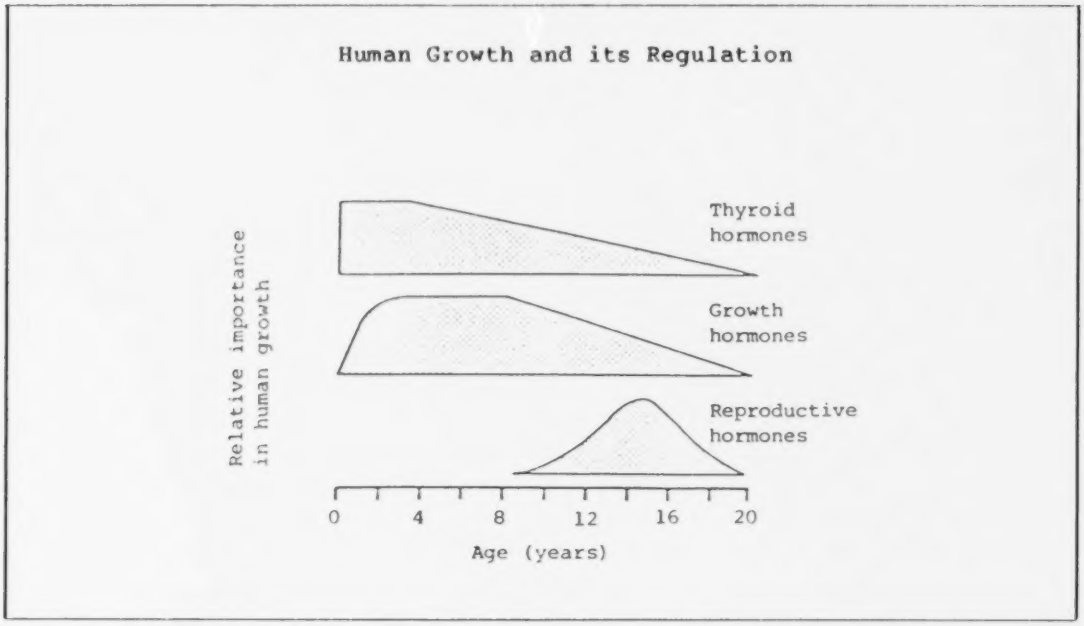
64. In the human male, sufficient quantities of viable sperm cannot be produced at normal body temperature. An adaptation that overcomes this problem is

A. fertilization occurring in the upper portion of the Fallopian tubes
B. the descent of the testes from the body cavity
C. the ascent of the testes into the body cavity
D. internal fertilization

65. The structure in males that carries BOTH urine from the bladder and sperm from the testes is the

A. ureter
B. urethra
C. vas deferens
D. seminal vesicle

Use the following graph to answer question 66.



66. From birth to age six, which endocrine glands promote growth in a male?

A. Thyroid and testes
B. Pituitary and testes
C. Thyroid and adrenals
D. Pituitary and thyroid

---

67. Shedding of the uterine lining is caused by a marked

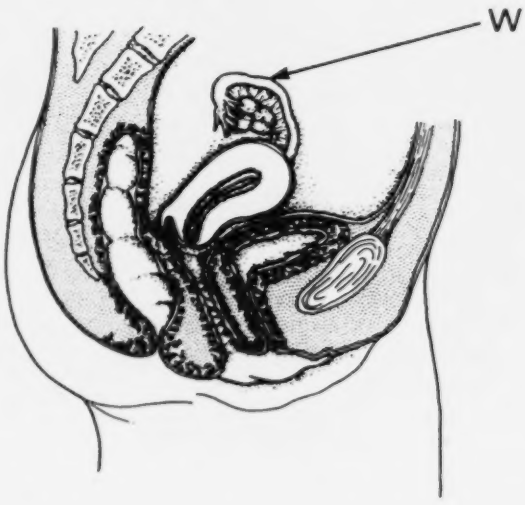
A. increase of LH
B. decrease of FSH
C. decrease of estrogens and progesterone
D. increase of estrogens and progesterone

68. During fertilization, penetration of the ovum occurs because the

A. sperm have a special pointed cellular shape
B. ovum takes the sperm in by the process of exocytosis
C. ovum takes the sperm in by the process of phagocytosis
D. sperm secrete an enzyme that dissolves part of the ovum's coating

Use the following diagram to answer question 69.

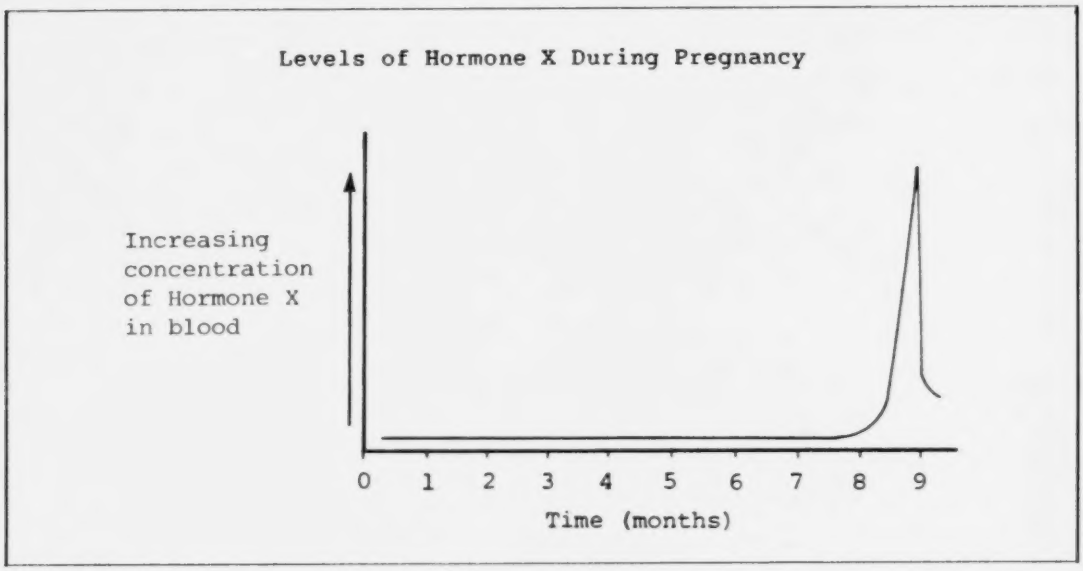
The Female Reproductive System



69. The structure in the male reproductive system similar in function to the structure labelled W is the

A. ureter
B. vas deferens
C. seminal vesicle
D. seminiferous tubule

Use the following graph to answer question 70.



70. The MOST likely effect of Hormone X is to

A. stimulate the thickening of the endometrium
B. increase the growth and function of the placenta
C. increase the production of progesterone by the corpus luteum
D. initiate contraction of the smooth muscles of the uterine wall

---

YOU HAVE NOW COMPLETED THE MULTIPLE-CHOICE SECTION OF THE EXAMINATION. PLEASE PROCEED TO THE NEXT PAGE AND ANSWER THE WRITTEN-RESPONSE QUESTIONS IN PART B.

PART B

INSTRUCTIONS

Please write your answers in the examination booklet as neatly as possible.

Communicate your answers in clear, concise sentences. Marks will be awarded for pertinent explanations and answers.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

TOTAL MARKS: 30

START PART B IMMEDIATELY

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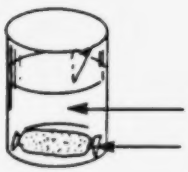
Use the following information to answer question 1.

An Osmosis Experiment

Initial Setup

Beaker #1



distilled water

dialysis bag* containing 25 mL of a 0.5 mol/L glucose solution

Beaker #2

distilled water

plastic bag* containing 25 mL of a 0.5 mol/L glucose solution

*permeable to water

After 24 hours, the solutions outside the bags were tested with Benedict's reagent, and the following results were recorded.

Results of Benedict's Test	
Solution from Beaker #1	orange
Solution from Beaker #2	blue

(5 marks)

1. a. From the results, what inference can be made about the difference in permeability between the dialysis bag and the plastic bag? Support your inference with evidence from the experimental data.

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b. If you were to determine the change in mass of the two bags and their contents at the end of the experiment, which one would have the GREATER increase in mass? Explain your choice.

Use the following information to answer question 2.

A patient in poor health is admitted to a hospital. The results of a mineral analysis of the patient's blood are shown below.

Mineral Ions	Concentration in Normal Blood (%)	Concentration in Patient's Blood (%)
Sodium	0.3200	0.3199
Potassium	0.0200	0.0200
Ammonium	0.0010	0.0010
Calcium	0.0100	0.0060
Magnesium	0.0025	0.0025
Chloride	0.3700	0.3695

2. Identify the mineral deficiency and state THREE bodily functions that would be affected by this deficiency. (4 marks)

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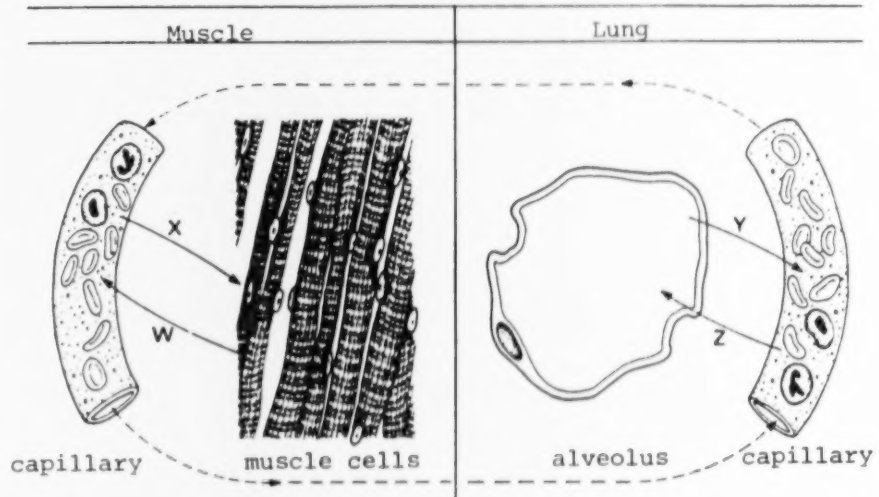
Use the following diagram to answer question 3.

Gas Movement Between Blood, Lungs, and Cells



(4 marks)

3. a. Which TWO arrows symbolize a net movement of carbon dioxide?

b. Explain why there are differences in carbon dioxide levels between the capillary and the muscle cells as well as the capillary and the alveolus.

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4. A medical doctor referred to the following data in the diagnosis of a patient.

(4 marks)

Comparison of Some Components of Plasma, Nephric Filtrate, and Urine for Patient X.

Components (g/100 mL of fluid)	Fluids		
	Plasma	Nephric Filtrate	Urine
Urea	0.030	0.030	2.00
Uric acid	0.004	0.004	0.05
Glucose	0.100	0.100	0.00
Amino acids	0.050	0.050	Trace
Total inorganic salts	0.720	0.720	1.50
Proteins and other colloids	8.000	0.000	0.00

a. What evidence leads the doctor to believe that Patient X is NOT suffering from diabetes mellitus (sugar diabetes)?

b. The doctor concluded that the kidneys of Patient X are functioning normally. How do the changes in concentration of each of the components of the fluids support this conclusion?

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(6 marks)

5. The sympathetic nervous system prepares the body for emergencies, the so-called "fight or flight" response. Impulses are sent to many different organs in the body to prepare it to meet the emergency. Choose THREE organs from different systems and explain how the function of each is altered so as to prepare the body to meet the emergency.

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Use the following information to answer question 6.

A man went to a medical doctor and reported that he tired very easily. For example, he could not open and close his hand in rapid succession more than four or five times before his muscles failed to respond. Tests showed that the muscle mass was normal and that the nervous system was functioning normally.

6. Provide TWO likely hypotheses that would account for the cause of the man's problem. Support your choices by showing how the hypotheses relate to muscle failure. (4 marks)

Hypothesis #1 _____

_____

_____

_____

_____

_____

Hypothesis #2 _____

_____

_____

_____

_____

_____

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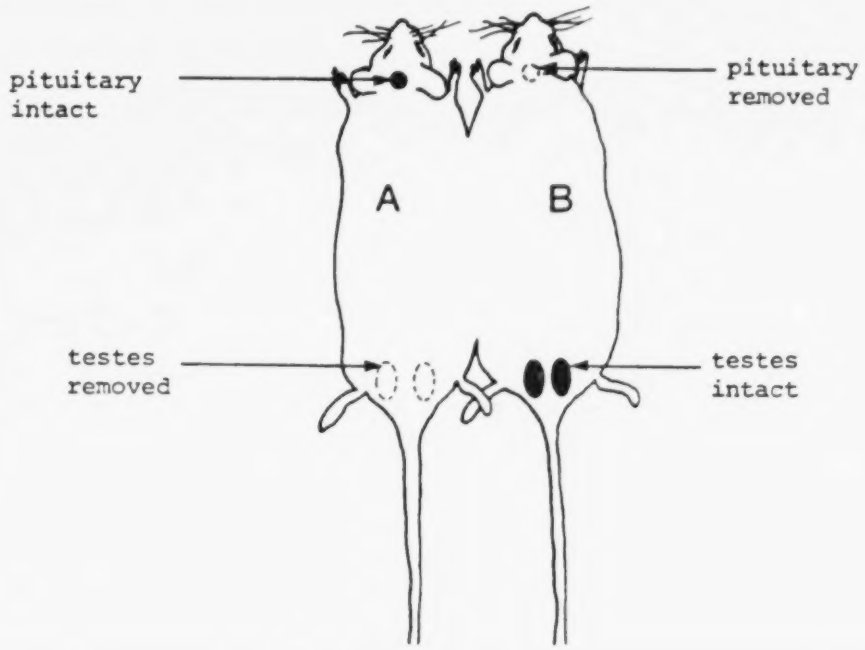
Use the following information to answer question 7.

In an experiment, two rats with compatible blood types were united by a lateral joining of the skin and abdominal muscles. It should be noted that the joining included some blood vessels in the area of fusion of the two animals.



Test Animal	Sperm in Urethra	Testosterone in Blood	Interstitial Cell Stimulating Hormone
Rat A	absent	present	present
Rat B	present	present	present

(3 marks)

7. Provide an explanation for the data obtained.

YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME, YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.

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M1 M2 M3 M4

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BIOLOGY 30

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SCHOOL CODE: SCHOOL: _____ SIGNATURE: _____

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